

# Modernization of Irrigation Systems in Japan



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## INTRODUCTION

- If “Irrigation service” is defined as a direct commitment in delivering water to farmers, the Japanese government does almost nothing , except in 7 projects of Japan Water Agency (JWA) , which was established after WW2.
- In other irrigation systems, major part of which originated in 17<sup>th</sup> to 19<sup>th</sup> Century, farmers serve water to themselves through the activities of water users’ organizations.

## Background of Japanese irrigation

Major target of irrigation is paddy.



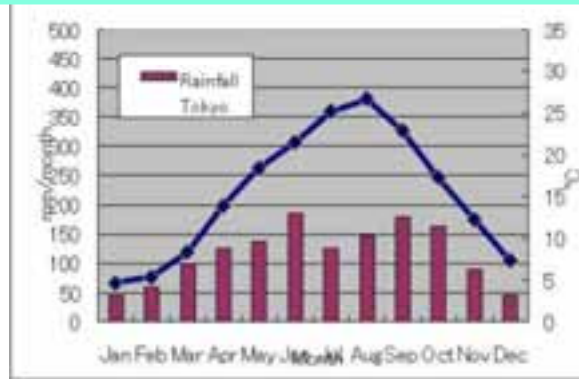
➤ **Fukuoka Zeki Irrigation System, developed in 1625 still functioning at present.**

➤ **Paddy is the most productive way of food production in the low lying watery plains of Japan.**

➤ **Upland is used for non-paddy without irrigation.**

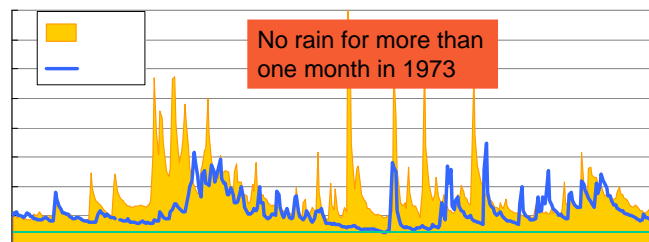


Japanese farmers can grow rice only once a year because of low temperature in winter.



Monthly temperature and rainfall in Tokyo, Japan

River flow in Japan fluctuates much because of erratic rainfall. Thus irrigation is a must for paddy.



Daily discharge in the Kitakami River at Fudabashi St. with a catchment area of 868 km<sup>2</sup>.

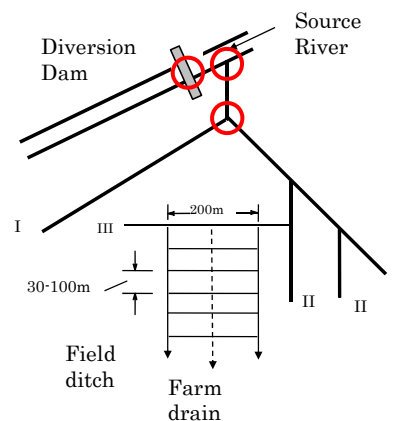
This fluctuation gives farmers abundant water in usual times, and serious water shortage during drought.

## Irrigation management bodies in Japan

- Most of Japanese irrigation systems are totally managed by farmers through **Land Improvement Districts (LIDs)**. After construction, all irrigation facilities are to be turned over to farmers.
- **JWA** managing irrigation systems, which emerged only after WW2, all the on-farm systems are managed by LID and farmers, while main facilities are managed by JWA.

## Water Management in Traditional Irrigation Systems

1. LID operate only main parts of the facilities. ○
2. Remaining parts are operated by the local communities.



## Special features of irrigation system in Japan

### Special features

- Water right system is established based on the **River Law** (1896).
- All the projects related to land and water for agriculture such as irrigation and land consolidation are defined as *land improvement project* and implemented based on the **Land Improvement Law** (1949); Water management is also defined as a part of *LIP*.

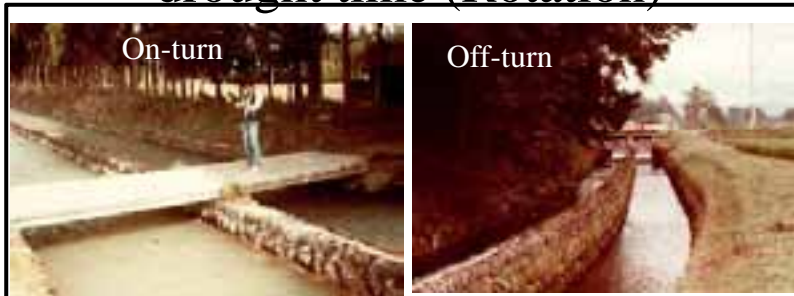
## Special features (Cont.)

- LIDs normally divert water from a source river as they need, but in case of drought they are requested to adjust water allocation by themselves.
- Water is free at the source river, However, all the on-farm water management cost is covered by farmers with their membership fee collected by LID on a area basis.

## Special features (Cont.)

- Water is free at the source river. However, all the on-farm water management cost is covered by farmers with their membership fee charged by LID on an area basis.
- In case of drought, unacceptable level of uneven water distribution emerges, then LID will change irrigation method from simultaneous -continuous irrigation to rotational one to get the equity.

## Water distribution by LID during drought time (Rotation)

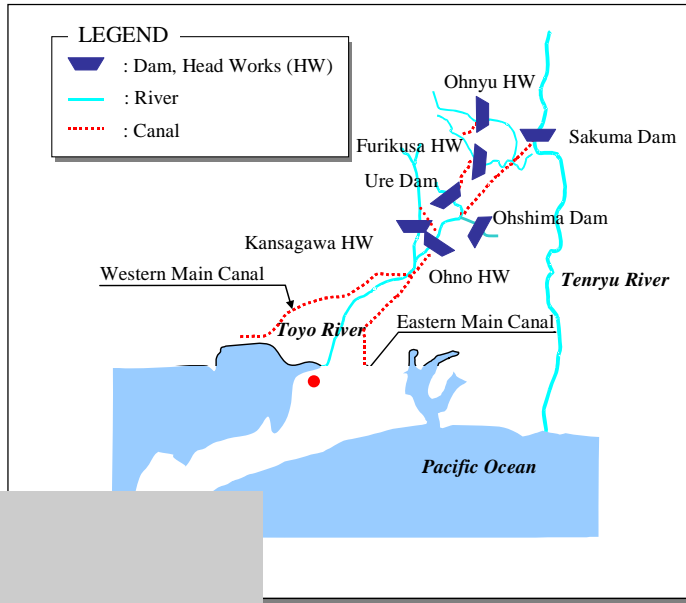


## Toyogawa Irrigation Project - a case of JWA management-

# The Toyogawa Irrigation project



Completed in  
1968  
Irrigated Area

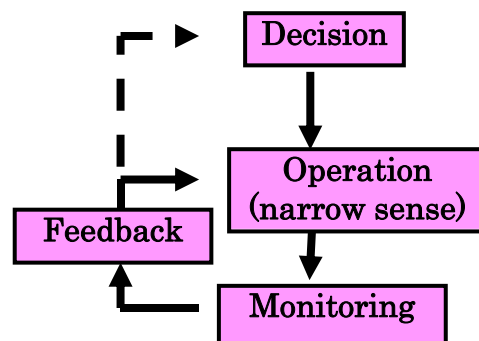




## Facilities operated by JWA and LID



**Operation (broad sense) consists of four functional elements.**



Operation (broad sense) is Operation in OM&M

## Main canal: *Managed* by JWA?

- Main canal of Toyogawa Irrigation Project is *managed (operated)* by JWA officers including delivery of water to each lateral canal.
- However, the target discharge for each has been decided in advance in the meeting with LID. JWA just *Operates* according to *Decision*.
- *Decision* is jointly done by LID and JWA.

## Primitive diversion weirs modernized in 1967 (Three irrigation intakes were merged.)

**Kottsu Irrigation System, established in 1650 for paddy area of 6,000 ha in Aichi Prefecture**



Farmers needed heavy labor to keep water course way after flood



Concrete weir saves labor. (Inuyama Diversion Dam)

## A Diversion Dam Managed by LID

- The diversion dam constructed in a governmental project was turned over to the Meiji Yosui LID, serving 5,700 ha of paddy field and 13,300 farmers.



Width of the weir:  
167m

Main canal of Meiji Irrigation system, old and modernized



**Old: Children swimming in the canal**



**Modernized: Made of concrete and guarded by fence to prevent children from jumping into the canal**

The main canal was buried for pressured pipeline irrigation system. A promenade was created replacing the traditional irrigation canal



## Field Turnout

Traditional open type field ditch



Buried pipeline system has been introduced recently, reducing water management labor and conflicts.



### Government contribution to the modernization of irrigation systems tied with change

The Japanese gov. can not directly improve irrigation management, but through LID.

Type 1: Unification of irrigation systems in a river basin → Conflict resolution among water users organizations

Type 2: Canal improvement → Improving water distribution system

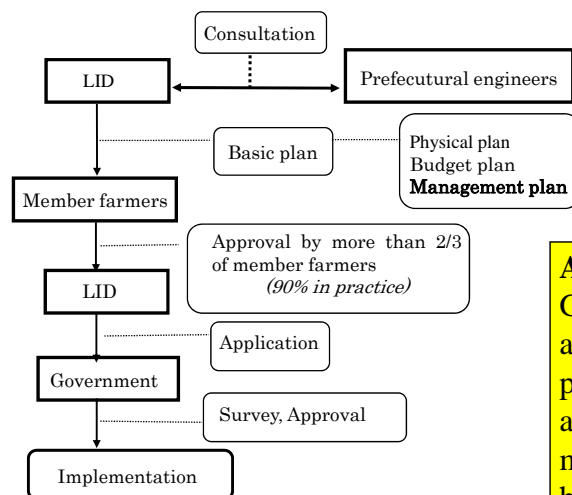
## Meiji Modernization project (pipeline) took away local powers for fairness.



Traditional local powers opposed the new water management system, insisting the continuation of gate operation by themselves.

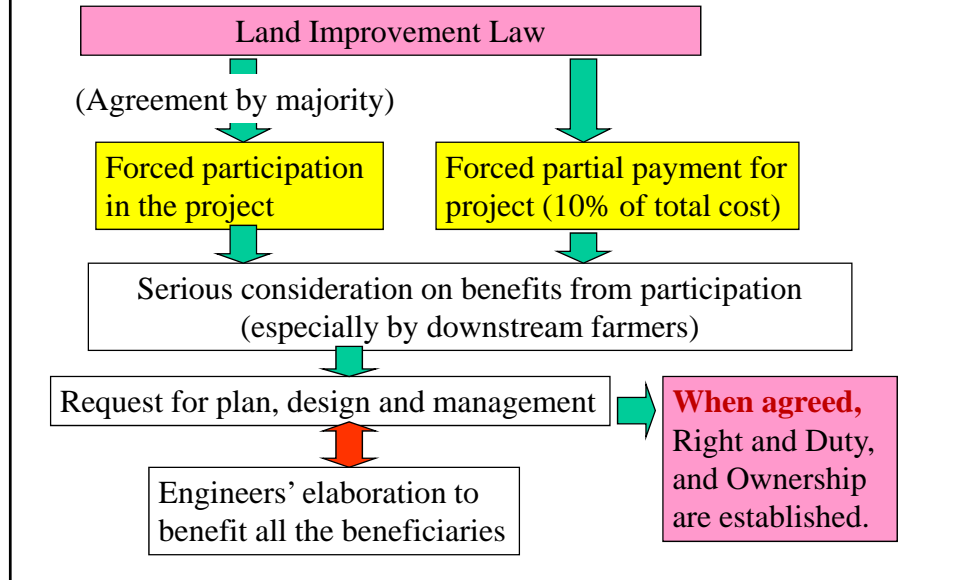
- Main divisions of main canals and major turn-outs for lateral canal are controlled and monitored here.
- The LID hires engineers and technicians to operate this kind of modernized facilities.

## Procedure of Irrigation Improvement Project Formation (**Application system**)



**Application system:**  
Government is not allowed to start any project without application to which most of the farmers have agreed.

## How Land Improvement Law works



## Maintenance activity of farmers for the Manno-ike irrigation tank

